

### Amendments to the Claims

1. (Currently amended) A method of preparing (S)-chiral alcohol comprising:

(a) reacting in organic solvent a compound of the following chemical formula 1 as a starting material,

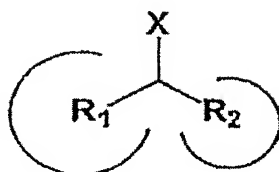
a racemization metal catalyst,

an acyl donor being capable of acylating an alcohol compound, and

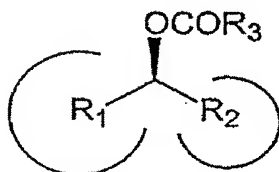
a protein hydrolysis enzyme selected from the group consisting of stabilized ~~or fixed~~ subtilisin, chymotrypsin, papain, protease from *Aspergillus oryzae*, protease from *Aspergillus melleus*, protease from *Streptomyces griseus*, and protease from *Bacillus stearothermophilus* and being capable of stimulating the enantioselective acylation of a racemic compound to obtain a chiral ester compound of chemical formula 3; and

(b) hydrolyzing the chiral ester compound of chemical formula 3 to obtain (S)-chiral alcohol;

[chemical formula 1]



[chemical formula 3]



wherein X is -OH or = O, R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> are independently substituted or unsubstituted C<sub>1</sub>-C<sub>15</sub> alkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkenyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub>, alkynyl, substituted or unsubstituted C<sub>5</sub>-C<sub>18</sub> aryl, substituted or unsubstituted C<sub>6</sub>-C<sub>18</sub> arylalkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>20</sub> heterocycle, substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> heteroarylalkyl, substituted or unsubstituted C<sub>3</sub>-

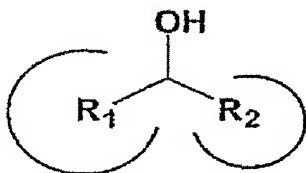
C<sub>15</sub> cycloalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>15</sub> cycloalkenyl, substituted or unsubstituted C<sub>6</sub>-C<sub>15</sub> cycloalkynyl, or substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> ~~heterocycloalkyl~~ heterocycloalkyl, wherein the R<sub>1</sub> group and the R<sub>2</sub> group can be linked together, and wherein a size of a circular arc indicates that the R<sub>1</sub> group is larger than the R<sub>2</sub> group.

2. (Previously presented) The method of preparing (S)-chiral alcohol according to claim 1, further comprising adding a hydrogen donor in step (a) when the starting material of chemical formula 1 comprises a ketone such that X is =O.

3. (Currently amended) The method of preparing (S)-chiral alcohol according to claim 1:

wherein the starting material of chemical formula 1 is ~~[[the]]~~ a compound of the following chemical formula 1a;

[chemical formula 1a]

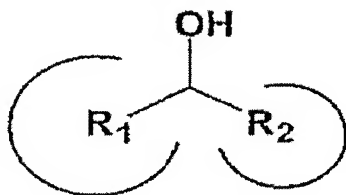


wherein R<sub>1</sub> and R<sub>2</sub> are independently substituted or unsubstituted C<sub>1</sub>-C<sub>15</sub> alkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkenyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkynyl, substituted or unsubstituted C<sub>5</sub>-C<sub>18</sub> aryl, substituted or unsubstituted C<sub>6</sub>-C<sub>18</sub> arylalkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>20</sub> heterocycle, substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> heteroarylalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>15</sub> cycloalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>15</sub> cycloalkenyl, substituted or unsubstituted C<sub>6</sub>-C<sub>15</sub> cycloalkynyl, or substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> ~~heterocycloalkyl~~ heterocycloalkyl; and wherein R<sub>1</sub> and R<sub>2</sub> can be linked together.

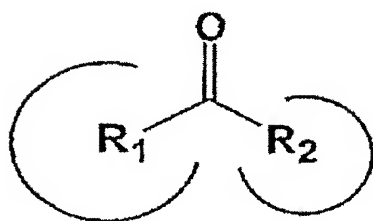
4. (Currently amended) The method of preparing (S)-chiral alcohol according to claim 3, further comprising:

obtaining an alcohol compound of chemical formula 1a by adding a hydrogen donor to a ketone compound of the following chemical formula 1b to reduce it;

[chemical formula 1a]



[chemical formula 1b]

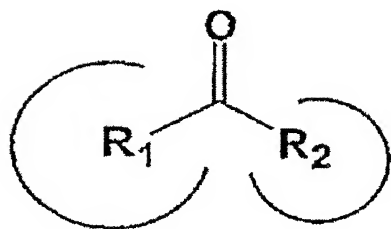


wherein R<sub>1</sub> and R<sub>2</sub> are independently substituted or unsubstituted C<sub>1</sub>-C<sub>15</sub> alkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkenyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkynyl, substituted or unsubstituted C<sub>5</sub>-C<sub>18</sub> aryl, substituted or unsubstituted C<sub>6</sub>-C<sub>18</sub> arylalkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>20</sub> heterocycle, substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> heteroarylalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>15</sub> cycloalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>15</sub> cycloalkenyl, substituted or unsubstituted C<sub>6</sub>-C<sub>15</sub> cycloalkynyl, or substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> ~~heterocycloalkyl~~ heterocycloalkyl; and wherein R<sub>1</sub> and R<sub>2</sub> can be linked together.

5. (Currently amended) The method of preparing (S)-chiral alcohol according to claim 1, further comprising:

adding a hydrogen donor to reduce a ketone group in step (a); wherein the compound of chemical formula 1 comprises chemical formula 1b;

[chemical formula 1b]



wherein  $R_1$  and  $R_2$  are independently substituted or unsubstituted  $C_1$ - $C_{15}$  alkyl, substituted or unsubstituted  $C_2$ - $C_{15}$  alkenyl, substituted or unsubstituted  $C_2$ - $C_{15}$  alkynyl, substituted or unsubstituted  $C_5$ - $C_{18}$  aryl, substituted or unsubstituted  $C_6$ - $C_{18}$  arylalkyl, substituted or unsubstituted  $C_2$ - $C_{20}$  heterocycle, substituted or unsubstituted  $C_3$ - $C_{20}$  heteroarylalkyl, substituted or unsubstituted  $C_3$ - $C_{15}$  cycloalkyl, substituted or unsubstituted  $C_3$ - $C_{15}$  cycloalkenyl, substituted or unsubstituted  $C_6$ - $C_{15}$  cycloalkynyl, or substituted or unsubstituted  $C_3$ - $C_{20}$  ~~heterocycloalkyl~~ heterocycloalkyl; and

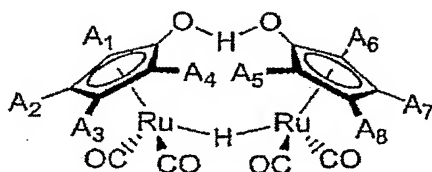
wherein  $R_1$  and  $R_2$  can be linked together.

6. (Previously presented) The method of preparing (S)-chiral alcohol according to claim 1, wherein step (a) of the reaction comprises a one-pot reaction and wherein the reaction is performed in one vessel.

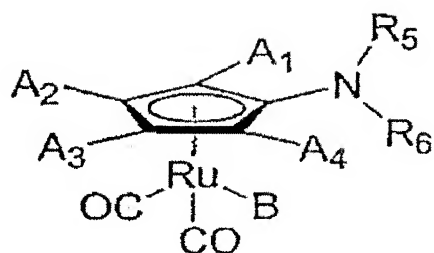
7. (Original) The method of preparing (S)-chiral alcohol according to claim 1, wherein the metal catalyst comprises a ruthenium complex compound.

8. (Original) The method of preparing (S)-chiral alcohol according to claim 1, wherein the metal catalyst is selected from the group consisting of ruthenium complex compounds represented by the following chemical formulas 4 to 8:

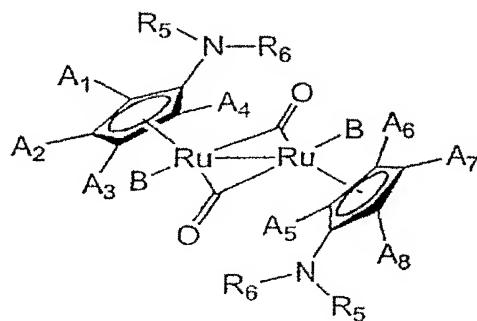
[chemical formula 4]



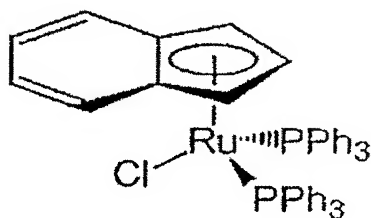
[chemical formula 5]



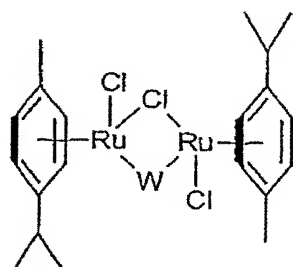
[chemical formula 6]



[chemical formula 7]



[chemical formula 8]



wherein A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>, A<sub>4</sub>, A<sub>5</sub>, A<sub>6</sub>, A<sub>7</sub> and A<sub>8</sub> are independently hydrogen, substituted or unsubstituted C<sub>1</sub>-C<sub>10</sub> alkyl, substituted or unsubstituted C<sub>5</sub>-C<sub>18</sub> aryl, or substituted or unsubstituted C<sub>2</sub>-C<sub>20</sub> heterocycle;

wherein R<sub>5</sub> and R<sub>6</sub> are independently hydrogen, substituted or unsubstituted C<sub>1</sub>-C<sub>15</sub> alkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkenyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkynyl, substituted or unsubstituted C<sub>5</sub>-C<sub>18</sub> aryl, substituted or unsubstituted

C<sub>6</sub>-C<sub>18</sub> arylalkyl, substituted or unsubstituted C<sub>1</sub>-C<sub>20</sub> heterocycle, substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> heteroarylalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>15</sub> cycloalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>15</sub> cycloalkenyl, substituted or unsubstituted C<sub>6</sub>-C<sub>15</sub> cycloalkynyl, or substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> heterocycloalkyl; wherein B comprises a substituent selected from the group consisting of hydrogen, carbonyl, halogen and trifluoromethanesulfonate or there is no substituent in B site; and wherein W is hydrogen or a halogen.

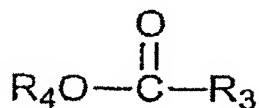
9. (Previously presented) The method of preparing (S)-chiral alcohol according to claim 2, wherein the acyl hydrogen donor comprises 2,4-dimethyl-3-pentanol, 2,6-dimethyl-4-heptanol, formic acid, or hydrogen.

10. (Original) The method of preparing (S)-chiral alcohol according to claim 1, wherein the acyl donor is linked to the R<sub>1</sub> group or the R<sub>2</sub> group of the chemical formula 1.

11. (Original) The method of preparing (S)-chiral alcohol according to claim 10, wherein the acyl donor is a substituent including a -OCO-R<sub>3</sub> terminal group linked to the R<sub>1</sub> or R<sub>2</sub> of the chemical formula 1.

12. (Previously presented) The method of preparing (S)-chiral alcohol according to claim 1, wherein the acyl donor is a compound of the chemical formula 2; and

[chemical formula 2]



wherein R<sub>3</sub> and R<sub>4</sub> are independently substituted or unsubstituted C<sub>1</sub>-C<sub>15</sub> alkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkenyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkynyl, substituted or unsubstituted C<sub>5</sub>-C<sub>18</sub> aryl, substituted or unsubstituted C<sub>6</sub>-C<sub>18</sub>

arylalkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>20</sub> heterocycle, substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> heteroarylalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>15</sub> cycloalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>15</sub> cycloalkenyl, substituted or unsubstituted C<sub>6</sub>-C<sub>15</sub> cycloalkynyl, or substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> heterocycloalkyl.

13. (Canceled)

14. (Original) The method of preparing (S)-chiral alcohol according to claim 1, wherein the protein hydrolysis enzyme is subtilisin.

15. (Original) The method of preparing (S)-chiral alcohol according to claim 1, wherein the organic solvent is benzene, toluene, C<sub>5</sub>-C<sub>10</sub> alkane, C<sub>5</sub>-C<sub>10</sub> cycloalkane, tetrahydrofuran, dioxane, C<sub>2</sub>-C<sub>10</sub> dialkylether, C<sub>3</sub>-C<sub>10</sub> alkylate, C<sub>2</sub>-C<sub>10</sub> cyanoalkane, C<sub>3</sub>-C<sub>10</sub> dialkyl ketone, dichloromethane, chloroform, carbon tetrachloride, C<sub>4</sub>-C<sub>10</sub> tertiary alcohol, or a room temperature ionic liquid.

16. (Previously presented) The method of preparing (S)-chiral alcohol according to claim 1, wherein the reaction temperature in step (a) is at a temperature between room temperature and 80°C.

17. (Canceled)

18. (Currently amended) A method of preparing (S)-chiral ester comprising:

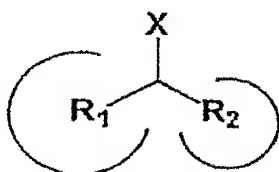
reacting in organic solvent a compound of the following chemical formula 1 as a starting material,

a racemization metal catalyst,

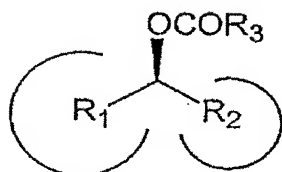
an acyl donor being capable of acylating an alcohol compound, and

a protein hydrolysis enzyme selected from the group consisting of stabilized or fixed subtilisin, chymotrypsin, papain, protease from *Aspergillus oryzae*, protease from *Aspergillus melleus*, protease from *Streptomyces griseus*, and protease from *Bacillus stearothermophilus* and being capable of stimulating the enantioselective acylation of a racemic compound to obtain a chiral ester compound of chemical formula 3.

[chemical formula 1]



[chemical formula 3]



wherein  $R_1$  and  $R_2$  are independently substituted or unsubstituted  $C_1$ - $C_{15}$  alkyl, substituted or unsubstituted  $C_2$ - $C_{15}$  alkenyl, substituted or unsubstituted  $C_2$ - $C_{15}$  alkynyl, substituted or unsubstituted  $C_5$ - $C_{18}$  aryl, substituted or unsubstituted  $C_6$ - $C_{18}$  arylalkyl, substituted or unsubstituted  $C_2$ - $C_{20}$  heterocycle, substituted or unsubstituted  $C_3$ - $C_{20}$  heteroarylalkyl, substituted or unsubstituted  $C_3$ - $C_{15}$  cycloalkyl, substituted or unsubstituted  $C_3$ - $C_{15}$  cycloalkenyl, substituted or unsubstituted  $C_6$ - $C_{15}$  cycloalkynyl, or substituted or unsubstituted  $C_3$ - $C_{20}$  ~~heterocycloalkyl~~ heterocycloalkyl, and  $R_1$  and  $R_2$  can be linked together; and wherein a size of a circular arc indicates that the  $R_1$  group is larger than the  $R_2$  group.

19. (Previously presented) The method of preparing (S)-chiral ester according to claim 18, further comprising adding a hydrogen donor in step (a) and wherein the starting material comprises ketone where  $X=O$ .

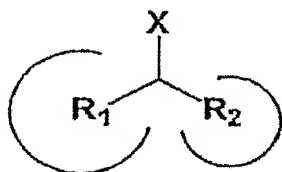


20. (Canceled)

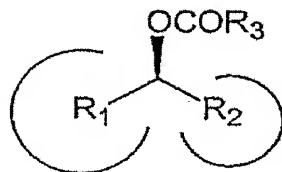
21. (Previously presented) A method of preparing (S)-chiral alcohol of the following chemical formula 1 comprising:

hydrolyzing the chiral ester of the chemical formula 3 prepared according to claim 18.

[chemical formula 1]



[chemical formula 3]



wherein X is -OH or = O,

wherein R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> are independently substituted or unsubstituted C<sub>1</sub>-C<sub>15</sub> alkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkenyl, substituted or unsubstituted C<sub>2</sub>-C<sub>15</sub> alkynyl, substituted or unsubstituted C<sub>5</sub>-C<sub>18</sub> aryl, substituted or unsubstituted C<sub>6</sub>-C<sub>18</sub> arylalkyl, substituted or unsubstituted C<sub>2</sub>-C<sub>20</sub> heterocycle, substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> heteroarylalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>16</sub> cycloalkyl, substituted or unsubstituted C<sub>3</sub>-C<sub>15</sub> cycloalkenyl, substituted or unsubstituted C<sub>6</sub>-C<sub>15</sub> cycloalkynyl, or substituted or unsubstituted C<sub>3</sub>-C<sub>20</sub> heterocycloalkyl; wherein R<sub>1</sub> and R<sub>2</sub> can be linked together; and wherein a size of a circular arc indicates that the R<sub>1</sub> group is larger than the R<sub>2</sub> group.